

The relationship between learning behavior in physical education practice and personality traits and physical fitness in college women

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ABSTRACT

The purpose of this study was to determine the relationship of learning behavior elements in physical education practice and character traits and physical fitness. A questionnaire on learning behavior, developed by Demura, Yatabe-Guilford personality inventory, and physical fitness tests were administered to 1284 college women during the last week of each semester.

A correlative analysis between 8 learning behavior elements and 12 character scale scores, 6 character trait factors, and a physical fitness score was made to examine the relationship between them. In addition, the learning behavior elements in groups with different character types were compared to determine whether or not they differ among groups.

The results may be concluded as follows ;

1. Many college women have a somewhat less aggressive and active character and a relatively high nervous character. Those with a personality type of B and D are the majority and they made up about 60% of the total subjects.

It was confirmed that in physical education practice, many students obey directions of a teacher and follow the determined rules.

2. Physical fitness and many character traits relate to various kinds of learning behavior elements in physical education practice, but they especially relate highly to the following kinds of learning behavior : "positive-passive", "solving problems through discussion", and "expecting admiration".
3. Extroverts participate positively in various activities of physical education, but they also disturb classes and behave insincerely.

I. Introduction

Studies on learning behavior in physical education practice have been conducted from various standpoints mainly by Noguchi et al.⁵⁻¹¹ Learning behavior is considered to be

produced by the complicated entanglement of various factors such as the teacher, teaching materials, facilities and equipment, curricula, and so on.¹⁻² However, especially, physical characteristics are considered as one of the most important factors determining learning behavior in physical education practice. Mental traits also seem to influence learning behavior in a different way from work performed in a classroom.

Although this idea has been suggested before, little concrete research has been done.¹ An important reason may be the fact that the test to estimate learning behavior itself objectively and rationally has not been established in spite of the fact that it is used as a criterion.

The purpose of this study was to determine the relationship between various learning behavior elements in physical education practice and personality traits and physical fitness in college women.

II. Method

Subjects

The subjects were 1284 college women, with a mean age of 18.6. They practiced tennis, hand ball, basketball, volleyball, table tennis, and badminton in college classes. Some of them were engaged in sports club activity in junior and senior high school, and college. The following tests were administered to them during the last week of each semester. Some inconsistency in sample sizes of each variable (see Table 1) occurred because of eliminating unclear data before practical statistical analysis.

A questionnaire on learning behavior

Demura, et al.¹ examined statistical validity and reliability of a questionnaire on learning behavior, consisting of 48 items, developed by Noguchi et al. As a result, they found 8 learning behavior factors as shown in Table 1, and constructed a convenient questionnaire with high validity and reliability to estimate learning behavior in physical education practice in college women. It consists of 20 question items to measure 8 learning behavior factors (see materials on page 10). In this study, this questionnaire was used to estimate college women's learning behavior.

Each item is based on Likert's method.³ A student must respond to any of the following 7 rating scales to each question item like "Do you engage~in physical education practice".: "always", "many times", "sometimes", "occasionally", "a few times", "seldom", and "not at all".

Personality Inventory

The Yatabe-Guilford Personality Inventory (Y-G test)¹² was used to examine students' personality traits, because this is widely used. This test consists of 120 items and 12 personality scale scores are calculated (see Table 1). And from these scale scores, character trait factors of emotional stability (EM), social adaptability (SO), activity (AC), impulsiveness (IM), introversion (IN), and dominance (DO) are evaluated. Furthermore, based on scores of these 6 factors, the student's personality can be categorized in any of 6 typical personality types as

shown in Table 2.

Physical fitness tests

Generally, it is assumed that physical fitness for performance consists of elements such as muscular strength, endurance, power, flexibility, balance, agility, and so on. Therefore, the following tests representing the above-mentioned elements were selected to measure physical fitness: grip strength (right and left), back strength, one-minute squat thrust, vertical jump, standing-forward trunk flexion, trunk-bending in a prone state, and side-step. All tests except the one-minute squat thrust are included in a physical fitness test battery manual of the Ministry of Education of Japan.⁴

A squat thrust test was used to measure total body endurance. In this test, a subject was requested to repeat the following series of performances as many times as possible within one minute: squat from a standing posture, thrust feet backward and push-up posture, pull feet toward arms, and take a standing posture. These physical measures besides physique measures of stature and body weight were changed into standard scores, based on means and standard deviations of each variable. The sum of them was used as the physical fitness score (PH) of each individual person.

Statistical procedures

A simple correlation test and a multiple correlation test were used to determine the relationship between learning behavior elements and personality traits and physical fitness. The ANOVA test was used to find out whether or not means among 6 groups with different personality types differ significantly. Multiple comparison tests were done to find where the significance in the ANOVA existed, comparing two means.

III. Results and discussion

The relationship between learning behavior elements and character traits and physical fitness.

Table 1 shows the descriptive statistics of all variables selected in this study for all samples. First, viewing the results of learning behavior elements, obedience and observance (F7) has a very high value of 6.1, and positive-passive (F1) and comparison and observation (F6) have values greater than 4.6. A 6-score means that a student answered to each question on learning behavior "many times". Next, in personality traits, depression (D) and nervousness (N) show somewhat higher values while aggressiveness (Ag) and general activity (G) show somewhat lower values (average is 10). In evaluating from the standpoint of a 5-point-standard-score, values of N and O (a lack of objectivity) correspond to a 4-point, and Ag and G correspond to points below 2.

From these results, generally, it is considered that in physical education practice, college women tend to obey directions of their teacher and follow the determined rules. Concerning personality traits, many students seem to have a somewhat less aggressive and active charac-

ter, and a relatively high nervous character.

Table 1. Means and standard deviations for all variables.

	variable	NS	AV	SD	MAX	MIN
LA	positive-passive (F1)	1273	4.6	1.03	7.0	1.2
	solving problems through discussion (F2)	1273	4.2	1.17	7.0	1.0
	insincere-disturbing (F3)	1273	3.5	1.08	7.0	1.0
	expecting admiration (F4)	1274	3.5	1.36	7.0	1.0
	preparation and review (F5)	1273	3.6	1.14	7.0	1.0
	comparison and observation (F6)	1274	4.7	0.89	6.8	1.5
	obedience and observance (F7)	1274	6.1	0.63	7.0	2.0
	deliberation and safe confirmation (F8)	1274	3.6	1.26	7.0	
	total learning behavior score (TO)	1271	33.8	4.85	50.7	16.8
CH	depression (D)	1281	13.6	4.24	20.0	0.0
	cyclic tendency (C)	1281	10.1	4.63	20.0	0.0
	inferiority (I)	1281	10.9	4.10	20.0	0.0
	nervousness (N)	1281	13.1	4.14	20.0	0.0
	lack of objectivity (O)	1281	11.2	3.87	20.0	0.0
	lack of cooperativeness (Co)	1281	10.9	3.95	20.0	0.0
	aggressiveness (Ag)	1281	6.4	3.61	20.0	0.0
	general activity (G)	1281	7.9	3.97	20.0	0.0
	rhathymia (R)	1281	8.9	4.70	20.0	0.0
	thinking activity (T)	1281	9.0	4.73	20.0	0.0
	ascendance (A)	1281	10.1	4.65	20.0	0.0
	social extraversion (S)	1281	9.3	5.55	20.0	0.0
CF	emotional stability (EM)	1281	11.9	3.17	19.5	2.0
	social adaptability (SO)	1281	9.5	2.48	16.7	2.0
	activity (AC)	1281	7.1	3.32	20.0	0.0
	impulsiveness (IM)	1281	8.4	3.83	19.0	0.0
	introversion (IN)	1281	8.9	4.33	20.0	0.0
	dominance (DO)	1281	9.7	4.56	20.0	0.0
	physical fitness score (PF)	1284	438.3	70.21	591.7	46.7

Note: LA=learning behavior element, CH=character scale score, CF=character trait factor. Values of each character trait factor are means of character scale scores in the following parentheses: EM(D, C, I, N), SO(O, Co, Ag), AC(Ag, G), IM(G, R), IN(R, T), DO(A, S).

In case of EM, SO, and IN, the higher score means that the trend of these character traits is lower.

The frequency of 6 personality types is shown in Table 2. The number of D-types (37.2%) are the highest and B-types (21.7%) are second. Both made up about 60% of the total subjects. They tend to have an extraverted personality (TP). C- and D-types have in common that they are stable in EM, and adaptive in SO. A-types are average in EM and SO. The sum of these 3 types is about 65.6% of all subjects. F-types are called doubtful or cranky, and they made up about 1.6% of all subjects. The above results show the trait of a sample which was analysed in this study.

Table 2. Frequency and feature of each personality type.

type	N(%)	EM	SO	TP
A	248(19.4)	average	average	average
B	278(21.7)	unstability	inadaptation	extraversion
C	115(9.0)	stability	adaptation	introversion
D	477(37.2)	stability	adaptation/average	extraversion
E	142(11.1)	unstability	inadaptation/average	introversion
F	21(1.6)			

Note: EM and SO are the same as those in Table 1.

TP is trend of personality, and it is judged from character scale scores of G, R, T, A and S (These signs correspond to those in Table 1).

Table 3 shows simple correlation coefficients between learning behavior elements and character traits and physical fitness. The highest value is 0.433 between F1 and C, and the other values are relatively lower than 0.404, although in many cases, significance is found. Three learning behavior elements of F1, F2 and F4 show significant correlations with all character trait factors from EM to DO. The above results seem to indicate that personality traits and physical fitness relate to learning behavior, but the size of the relationship is not so high.

Table 3. Correlation among learning behavior elements and character traits, and physical fitness.

	F1	F2	F3	F4	F5	F6	F7	F8	TO
D	384*	313*	-193*	087*	066*	067*	-041	129*	194*
C	433*	296*	-137*	117*	076*	097*	-016	131*	234*
I	082*	001	-094*	-084*	-111*	-141*	012	-146*	-116*
N	275*	171*	-311*	137*	-016	056	-112*	-009	059*
O	362*	247*	-085*	114*	079*	100*	050	139*	228*
Co	228*	160*	-127*	154*	104*	129*	-063*	096*	168*
Ag	-089*	-118*	-036	123*	-012	024	-102*	-023	-038
G	-126*	-041	-121*	119*	009	035	-114*	003	-036
R	-218*	-107*	012	108*	023	087*	-051	-014	-027
T	-344*	-151*	-002	086*	-037	-008	-045	-076*	-121*
A	-087*	-034	-148*	107*	-012	060*	-125*	-060*	-052
S	-204*	-103*	-040	053*	-012	004	-121*	-034	-087*
EM	404*	270*	-246*	089*	009	031	-052	041	133*
SO	266*	156*	-129*	201*	090*	132*	-057	112*	189*
AC	-124*	-089*	-092*	138*	-001	034	-124*	-011	-042
IM	-199*	-087*	-056	128*	019	071*	-090*	-007	-035
IN	-306*	-140*	005	106*	-008	043	-052	-049	-081*
DO	-168*	-080*	-100	087*	-013	033	-137*	-051	-080*
PH	249*	082*	-017	103*	032	046	056*	033	128*

Note: Each sign is the same as those in Table 1.

*significant at 5% level.

Test results of multiple correlations of each learning behavior element and 6 character trait factors and physical fitness are shown in Table 4. The values of each multiple correlation coefficient as compared with the maximum values of each simple correlation coefficient shown

in Table 3 are somewhat higher. For example, a simple correlation coefficient between F1 and EM is 0.404, although multiple correlation coefficients between F1 and 6 character variables, and 7 variables besides physical fitness are 0.464 and 0.511, respectively. Therefore, each character trait and physical fitness seem to influence learning behavior with the complex form slightly greater than the simple form. But, the above results also seem to indicate that each character trait influences respective specific learning behavior elements. For example, of many character traits, especially D seems to relate closely to F1.

Table 4. Multiple correlation of each learning behavior element and character traits and physical fitness.

	F1	F2	F3	F4	F5	F6	F7	F8	TO
EM	**	**	**	**	**		**	**	
SO	**	**	**	**	**	**	**	**	**
AC	**	**	**		**	**	**	**	**
IM	*	**			**	**		**	**
IN	**	*		**	*			**	
LE			**	*			**	*	**
PF	*			*					*
R1	464*	301*	315*	241*	148*	186*	189*	177*	271*
R2	511*	306*	318*	261*	153*	196*	193*	174*	288*

Note 1: * means a standard partial regression coefficient was significant (5% level).

2: R1 and R2 are multiple correlation coefficients of learning behavior and 6 character trait factors, and 6 factors besides physical fitness, respectively.

3: * on the left side below F1 to TO is when R1 was calculated, and on the right side is when R2 was calculated.

Any of F3, F5, F6, and F8 did not show significant correlations with PH (see table 3). However, all multiple correlations between learning behavior elements and 7 explanatory variables besides physical fitness were significant. Therefore, PH is considered to relate to learning behavior more as a complex factor with character traits rather than as a single factor.

F2 and F3, especially F1 show higher correlation coefficients with character traits and PH than the other learning behavior elements. The above 3 learning behavior elements seem to be highly influenced by the mixed factor of character traits and physical fitness.

On the other hand, the significance of standard partial coefficients in each multiple correlation shows a variation according to each learning behavior element. Namely, some are significant and others are not. These results seem to indicate that even if the coefficients of almost the same size like F6 and F7 are found, the method of relating each character trait to learning behavior differs. For example, in explaining the above 2 learning behavior elements, based on 6 character trait factors, it is judged that EM relates significantly to F7, but not to F6, and in case of IM the reverse.

Table 5. Contribution of character trait factors and physical fitness to learning behavior elements.

	CT			PH			RR	F-value
	r	R	PA	r	R	PA		
F1	0.07	1.26	0.39	0.39	1.01	0.22	0.442	43.71**
F2	0.05	0.98	0.27	0.27	0.41	0.09	0.284	15.89**
F3	-0.02	1.08	0.23	0.22	0.18	0.05	0.230	10.10**
F4	0.01	0.91	0.16	0.16	0.69	0.11	0.193	6.96**
F5	0.04	0.53	0.08	0.08	0.16	0.04	0.088	1.40
F6	0.04	0.49	0.13	0.13	0.27	0.06	0.145	3.90**
F7	0.01	0.21	0.10	0.10	0.16	0.07	0.120	2.65*
F8	0.03	0.44	0.11	0.11	0.14	0.02	0.111	2.27*
TO	0.06	3.09	0.18	0.19	2.93	0.12	0.223	9.45**

r : correlation coefficient, RR : multiple correlation, R : range

PA : partial correlation, TO : total score of learning behavior elements,

CT : personality type, PH : physical fitness

F1 to TO corresponds to those in Table 1.

Table 5 shows the test results of the theory of the Qualification II, which is different from the above multiple regression analysis method to the point that the explanatory variables consist of the non-continuous or nominal scale. This multi-variate analysis method was used to determine to what degree both factors of character types (6 groups) and physical fitness (3 levels) relate to learning behavior. Significance in multiple correlation coefficients of learning behavior elements, except F5, is found. Overall, the value of F1 tends to be higher than those of the other learning behavior elements in a way similar to the results shown in Table 4.

In examining the partial correlation and the range of each explanatory variable, the personality type as compared with physical fitness tend to be somewhat higher in any learning behavior element.

Therefore, this result seems to indicate that mental factors influence learning behavior more than physical factors.

Comparison among 6 groups with different personality types in learning behavior elements.

Table 6 shows means, standard deviations and test results of the mean differences. Table 7 shows the test results of the multiple comparison. The significance in learning behavior elements, except F5, is found. Also in the results of Table 5, only F5 was not significant. Probably, the difference of personality types does not relate closely to preparation and review learning behavior (F5).

Table 6. Test results among means of 6-different-character-trait types in learning behavior elements and physical fitness.

	A		B		C		D		E		F		F-value
	AV	SD	AV	SD	AV	SD	AV	SD	AV	SD	AV	SD	
F1	4.35	0.95	4.71	0.98	4.08	0.91	5.01	0.94	3.95	0.95	3.69	0.93	45.54**
F2	4.02	1.10	4.41	1.15	3.82	1.10	4.43	1.14	3.57	1.14	3.43	0.85	20.30**
F3	3.61	1.07	3.21	0.96	3.92	1.08	3.39	1.04	3.77	1.20	4.29	1.09	13.54**
F4	3.44	1.25	3.79	1.38	3.02	1.17	3.47	1.36	3.47	1.52	2.86	1.09	7.44**
F5	3.55	1.12	3.66	1.14	3.57	1.03	3.66	1.20	3.48	1.07	3.12	0.89	1.58
F6	4.69	0.85	4.86	0.87	4.47	0.86	4.75	0.92	4.62	0.83	4.36	0.83	4.42**
F7	6.12	0.52	5.98	0.65	6.15	0.53	6.10	0.67	5.99	0.67	6.19	0.47	2.75*
F8	3.69	1.26	3.75	1.30	3.41	1.19	3.69	1.27	3.37	1.21	3.31	0.97	2.99*
TO	33.44	4.51	34.37	4.86	32.44	4.16	34.49	5.04	32.21	4.58	31.24	4.18	9.21**
PF	429.56	80.30	437.28	72.59	432.44	57.42	449.16	61.83	426.55	78.54	423.15	55.46	4.52**

Note : Each sign corresponds to those in Tables 1 and 2.

Viewing the test result of physical fitness in Table 7, D-types have a significantly higher score than the other personality types except F-types. D-types are stable in EM, adaptive in SO, and extroverted in TP (see Table 2). In case of college women, generally, those with this personality type may possess superior physical fitness. The total score of learning behavior elements is significantly higher in B-and D-types than in the other types, and in A-types than in E-and F-types.

Table 7. Test results of multiple comparison between means of 6 groups with different character.

LA	Comparison between means of groups
F1	D>B>A>C, E, F
F2	B, D>A, C, E, F /A>E, F
F3	F>A, E>D>B /C>A, B, D
F4	B>A, D, E>C, F
F6	B>A, C, E, F /D>C, F /A>C
F7	A, C, D>B /A>E
F8	A, B, D>C, E
TO	B, D>A, C, E, F /A>E, F
PH	D>A, B, C, E

Note 1: Each sign is the same as those in Tables 1 and 2.

2: A, C, D>B means A, C, and D have significantly greater values than B.

3: D>B>C means D as compared with B, and B with C has significantly greater values, respectively.

Viewing the test results of each learning behavior element, overall, D-types or B-and A-types as compared with the other types in F1, F2, F4, F6, and F8 have high values. And, C-and A-types, or B-types as compared with the others in F6, and B-and D-types with the others in F3 show significantly higher values, respectively. D-and B-types have in common that they

are extroverted in TP, and A-types are average, i. e., normal. TP of C-and E-types is introverted.

Considering the above results, it is inferred that students with an extraverted personality participate in various learning activities in physical education positively, but they also disturb classes and do not behave seriously. Students with emotional stability and social adaptation seem to take classes seriously, follow the determined rules, and obey directions of a teacher.

In summary, character traits and physical fitness relate to each learning behavior element slightly higher as a complex factor than as a respective single factor. But, like preparation and review learning behavior, also learning behavior elements without hardly receiving any influence of character traits and physical fitness exists.

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Materials. Question items on learning behavior in physical education class

1. You behave positively in physical education class (F1).
2. You observe performances of skilled friends carefully——(F6).
3. You follow friends' behavior——(F1*).
4. You practice (learn) in accordance with directions of a teacher——(F7).
5. You compare your ideas with friends' ideas——(F6).
6. You practice (learn) seriously——(F7).
7. You observe performances of unskilled friends——(F6).
8. You practice (learn) voluntarily——(F1).
9. you behave like getting admiration from a teacher——(F4).
10. You practice (learn) after confirmation that facilities and equipment are safe——(F4).
11. You practice (learn) systematically——(F8).
12. You compare your performances with friends' performances——(F6).
13. You frolick——(F3*).
14. You practice (learn) while thinking why you could do successful performances before——(F5).
15. You practice something you learned elsewhere (F5).
16. You behave like getting admiration from friends——(F4).
17. You chat——(F3*).
18. You participate in a discussion positively——(F2).
19. You summarize your ideas through discussion——(F2).
20. You practice (learn) timidly——(F1*).

Note: Signs in the parentheses mean names of learning behavior factors; F1: positive-passive, F2: solving problems through discussion, F3: insincere-disturbing, F4: expecting admiration, F5: preparation and review, F6: comparison and observation, F7: obedience and observance, F8: deliberation and safe confirmation. Variable number 3, 13, 17, and 20 are scored after changing the sign of plus or minus.